

5/15/2004

To: Virginia Sajac and addressees of her 5/11 e-mail

From Alex Hildebrand

cc Mike Chrisman
Lester Snow
John Herrick
CFBF and SJBF
CDFA (Steve Shaffer)
Mel Lytle
Stan Barnes

Attached are comments on the April report of the Agricultural Issues Center, and on the suitability of that report as a basis for estimates of future need for farm water in the State Water Plan.

Please distribute these comments to those who will determine how the AIC report will be used in the Water Plan and to those who will meet with the AIC authors on June 1.

5/15/2004

Comments by Alex Hildebrand on the Content and Utility of the April 2004 Report by
the U.C. Agricultural Issues Center Entitled
“Future Food Production and Consumption in California Under Alternative Scenarios”

Introduction

The above report contains some very interesting data and analyses regarding economic forces affecting crop mixes and the production of food. However, the report does not provide the answers needed for the State Water Plan. The Water Plan must estimate the developed water supply needed in California to produce the 2030 supply of food required to comply with AG 2587. Economic analyses are not the way to derive that estimate. Economic analyses can be very useful, but we don't use them to determine the streamflow needed to produce fish, or to determine whether we are healthier when we eat expensive food. Economic analyses are not a credible way to determine the developed agricultural water supply needed to grow an adequate supply of nutritionally balanced food.

Inadequacies of using this method to forecast the ag water supply needed for the Water Plan.

1) The AIC analysis of applied water needed to grow a constant dollar value of crop per acre of land does not meet Water Plan purposes in several respects. It only addresses the amount of water applied per acre as related to dollar yield. The excess of applied irrigation water over consumed water in the Central Valley is largely recovered and reused in the valley from groundwater and from return flow to streams. To the extent that we have reduced the over application of water while not reducing the consumptive use of water per unit of edible crop yields, we can not extrapolate our past ability to do so, and can not assume that this reduction in excess applied water has substantially reduced the valleywide need for an adequate developed water supply to grow food.

It is well established by agricultural experts and scientists that due to scientific limitation it takes a rather irreducible amount of water evaporated through the leaves of a given crop in a given climate to grow a pound of biomass. This fact is acknowledged in reports from U.C. Riverside agricultural researchers, and the scientific explanation of the limitation was explained to the Water Plan Advisory Committee by a professor of agriculture from U.C. Davis.

It follows that to produce a 50% increase in biomass with a given crop mix agriculture must consume about 50% more water. We have already increased the edible portion of the produced biomass for crops where much of the biomass is inedible. However, this progress is limited by the leaf area needed for photosynthesis and by the stalk strength needed for structural integrity. Some further progress is probable, but past progress can not be extrapolated because the easy gains have already been made.

2) Climate change

The AIC proposes that we rely on theoretical predictions that a specific type of climate change will occur before 2030, and that this will enable us to produce 15% more food with the same amount of applied water. The draft Water Plan discusses this possibility. However, that same climate change would also reduce the storage of water in snowpacks by millions of acre feet. The Water Plan makes no provision to maintain the developed water supply if this snowpack storage is lost. It would be highly irresponsible for the Water Plan to claim a substantial reduction in water requirement due to climate change while doing nothing to avoid the potential water losses that would result from the same climate change.

3) Dollar yield versus food yield

The AIC assumes that if we maintain the dollar value of food produced per acre we will thereby maintain the nutritional value produced per acre. This assumption implies that a dollar's worth of the most expensive variety of nuts, for example, has the same nutritional value as a dollar's worth of cabbage or potatoes. "High value" crops typically consume less water because they produce less edible biomass and, therefore, produce a less nutritional supply of food. If we export expensive foods that can be produced with less water and rely on importing foods that are grown with more water, we become dependent on the adequacy of the water supply in the states and nations from which we import food.

4) Dairy food

The AIC report is not clear regarding its analysis of dairy products. The overall report seems to imply that we should produce less "low value" crop like alfalfa and silage corn which consume a lot of water. However, dairy cows consume the entire biomass of those high biomass crops and convert it to high value dairy products that are in high consumer demand. Furthermore, 60 % of the hamburger meat derives from dairies.

An alternative approach to estimating future agricultural water needs

A more direct way to estimate future water needs is to assume first, as does the AIC, that the consumptive need for food will increase in approximate proportion to growth in population; second, that with current technology and crop mix and current applied water efficiency the available developed ag water supply would also have to increase in proportion to population; and, third, that this estimate of future water need can then only be reduced to the extent that we can define and quantify scientifically feasible and probable measures that have not already been adopted and which would increase the edible portion of produced biomass per unit of water or which would further reduce the amount of applied water that is in excess of consumptive need and which is not already recaptured and reused on a valleywide basis. These potential reductions could be due to less water being evaporated during application, less water being consumed by weeds, less consumption of water for environmental habitat that derives from return flows, etc.

Analyses of these specific remaining credible potentials for reducing applied water losses have not been included in the draft Water Plan.

Conclusion

The AIC report is interesting and has merit for other purposes. However, for the reasons discussed above it does not provide a credible estimate of the water supply that must be provided to produce an adequate and nutritionally balanced future food supply. That estimate is needed for the Water Plan. The Water Plan must, therefore, adopt the above described alternative approach to this estimate. The Plan must not rely on vague assumptions of unidentified or unverified future technology, or be based on an extrapolation of the combined effect of past improvements that have already been achieved, and it must not rely on future technology that is not scientifically possible.

A credible estimate of the water supply needed to produce an adequate future food supply is the most important estimate in the Water Plan. More water is necessarily consumed to grow food than to meet all other human needs. This is also important because the world-wide food supply already derives in substantial part from the unsustainable overdraft of the world's groundwaters.